

## **Stromberg NS-3SA carburetor assembly**

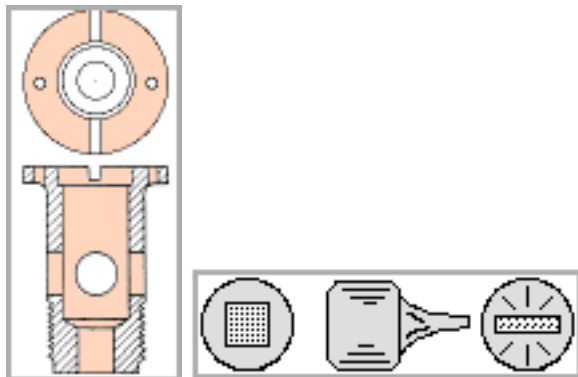
### **History**

The Stromberg carburetor used on our c-85 and c-90 continental engines is becoming more of a relic every year, and maintenance and overhaul of them are not as big a portion of the training of the new A&E's these days. Consequently, it might be handy to be aware of the noted points in this article and have it handy for when you assist the A&E and the A&I do an overhaul or simply a looksee once in a while. During the period when the Strombergs were the carburetor nearly every engine had, practical experience abounded and so did information from the old hands, but that day is gone. These tips were found out the hard way.

### **Tools**

Tools needed: 1. A "hydraulic head simulator", made up of a container with a tube outlet to which is attached a hose and a shutoff on the hose (we found that the soft rubber medical hose was best because it could be stretched over fittings and funnels and a c-clamp could be used as the valve). 2. A clean coffee can with top to pour the fuel from the carburetor in after each attempt of setting the float level. 3. A fuel height gage like the triple level unit in the article: "Carb Tools". 3. A blade screwdriver with a driving end that fits the segmented slot of the seat.

If none of your existing drivers are big enough----do not attempt to use a too-small driver. We made a tool that adapts to a socket wrench since you have to use a torque wrench anyway and there is no way to hook one of those to a screwdriver (tools such as this are standard from makers like snap-on). 5. Safety glasses, and 5. a fire extinguisher.



In order to use the torque wrench on the brass seat, a screwdriver with a wide and thick blade is needed to fit the segmented slot of the seat. This type of driver, made for a socket wrench, is the best solution.

### **Safety**

Safety should be paramount; since this setup suggests that you use fuel for the hydraulic head, never allow the mech to do the job where there is an open flame or sparks. Remember the water heater's flame and pilot light so common in a garage; it is better to be a bit uncomfortable than unsafe. The new fuels used today are different and can cause rashes or itching if allowed to come in contact with the skin, so, if you spill some on yourself, halt and get it off quickly. Be safe.

### **Bench setup**

The carburetor is unstable on the bench due to the position of the studs and the bottom plug; don't chance it staying balanced, since a tug on the hose will tend to knock the whole expensive assembly over. Make a nest to hold the carburetor, but do not use plastic as the nest, since the new fuels eat some plastics.

You want the carburetor level. After you have set the level observe it over a span of, say, fifteen minutes and make sure that it is not overflowing via the main nozzle.

If it does overflow via the main nozzle, you will have to readjust the float level to be a tad lower----but first, make sure that the drips are coming from the main nozzle or a hole in the side of the venturi----as Stromberg notes in their manual and in one of the service letters, some carburetors had their idle air openings positioned too low, and these can "leak" if the fuel level is higher than they are. The cure, also in the book and the service letter, was to plug the offending hole and re-drill another that was higher, opening above the fuel level. The important thing is to look before "correcting" the wrong thing. Don't assume your plane has the original or assigned carburetor, either; we have had so many interchanged carburetors noted to us that one cannot be too careful. Stromberg tells how to compare the part numbers with the engines, so check it!! That comment is true about the main jet, too, since it was common "in the old days" to change the main jet if one were to be flying from high airports or simply because the engine ran better—but no one bothered to make a note in the log books, so check and check again.

### **Safetying the components**

Safety the main fuel nozzle? Yes, though the manual is not explicit, but does say that all "internal" safetying should be done, except for the seat, before the level adjustments are made. There is a hole in the nozzle hex for a safety wire, so----safety it as well, even though not stated in the manual.

The 0.023 dia safety wire called out in the manual is certainly the most desirable because it is so easy to work in tight spaces but hard to find. If you have none of that size, then the next larger can be substituted, though 0.023 is a lot easier to manipulate within the body, and it gets out of the way better than does the heavier wire, an especially important item when considering the lack of clearances and possibilities of interferences of the bowl, needle, and float assembly. Use the smaller diameter wire, brass or steel, if you have it.

hyd head of 0.5 when setting level...40 inches is about 1 psi

### **Setting the float level:**

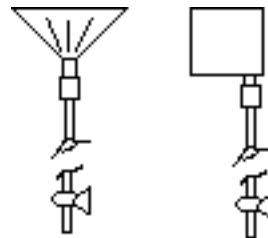
For reasons that will never be revealed to we earthlings, the gasoline that we treat so cavalierly is amazingly forgiving of our sloppiness----but----gasoline is astoundingly dangerous and don't ever forget it. Set up the operation with that in mind----doors open, no smoking, no gas-fired water heaters around, no clothes dryers or washers being used.....And have the fire extinguisher at your elbow at all times. Gasoline can bite and it won't ask permission first!!! The greatest fear many of us have is to be hurt with fire; the "tank" we are talking about for these experiments are above us to give the hydraulic head necessary to simulate the pressure of fuel from tanks; take no chances that the fuel can spill on you. Just having fuel on your skin will cause the skin to itch and, perhaps, hurt. Spilling fuel that is then ignited would ruin all our days. Think it through first, do the safety things first, or don't even attempt to do the job!!!

First, understand that the level will not be exactly 13/32cds, as specified. There are discrete steps of fuel level brought about by the thicknesses of the gaskets. According to the book, the difference in level caused by a 1/64th change in total gasket thickness causes a 5/64ths change in fuel level. The manual notes the allowable tolerances, and the conclusion from them is that the level, if it can't be the desired 13/32cds, is better higher than lower.

You can never!!!!, Almost never.....Achieve a tolerance of plus or minus 1/64th!!!! The manual says that a 1/64th change in gasket thickness will make a 5/64ths difference in fuel height. So, assume that the fuel level is 2/64ths high or low; when you increase or decrease the gasket thickness to accommodate, then you are changing the height by 5/64ths, which means that you are now 3/64ths low or high. The manual notes that the maximum number of gaskets to be used together is two.

### **Hydraulic head to simulate the fuel pressure in the plane**

Use a funnel and hose or use the coffee can and tube and shutoff as the "tank", placing the can as high as it will go with the tube---a previous member measured and established that a head of 42" is about right, but it is not critical. Surgical hose works well since it is easier to force over the fittings or the funnel end, but be aware that the next time you look at it, it will be all cracked and hard; for a onetime use, it is the best.



One psi per 40 inches of head. Stromberg requires 0.5 psi for the head for setting the level.

Make sure the fuel holder is secure from accidental tugs or swipes---don't take a chance of getting in on you, especially in your eyes!!! Having spilled some of the new fuel on the bench stool i was sitting on during a session with a carburetor, i can attest that the new fuel will rigorously attack any sensitive skin!!!-

Use the same fuel as you intend to use in the plane. Use fresh fuel. Expect the adjustment session to take about thirty minutes the first time, based on needing to twice change the gasket and check the level. If the duration is much longer, change the fuel before the final confirmation. Understand that the new fuels react differently than we are accustomed to---they eat paints that used to be non-affected, and will cause an intense itch very rapidly if spilled on the skin. If you spill any on the seat of the chair, as i did, stop the experiment there and shower asap, or regret it for hours!! Start with any gasket thickness under the seat, and snug the seat. Let in the fuel and see which way you have to go, either needing to add or decrease the gasket stack thickness.

Install the needle, tenderly, then the float, and then the float shaft (we found that a good magnet, like those on the end of magnets made for mechanics to retrieve dropped tools, works readily to start the float shaft out of it nest each time), but don't bother to install the float shaft retainer setscrew or the shaft hole plug during the setting session. With a dry bowl, release the fuel shutoff clamp/valve slowly, because the first fuel into the bowl will vigorously bubble and jet---right toward you or something that you did not want splashed with the fuel. Do not turn on the fuel and walk away, because the first gasket thickness might be such as to permit overflow. When you are close to having the correct thickness of gasket, let the fuel in, and let it creep to the final level over a span of, say, five minutes. Remember that the rate of fuel entering is not constant---Once the fuel level is near the maximum with the particular gasket, the rate of fuel entry is very!! Slow. Don't hurry the "seep/creep". A little vibration of the bowl will assist getting to the final level a little sooner, and simulates the vibration of the engine.-

When you have established the correct gasket thickness, make sure that the seat is torqued as noted in the manual, (that step is important, too) then safety it, being careful to ensure that the safety wire does not interfere with the float or the needle. Install the float shaft retainer and the shaft hole plug, reconfirm that there is no safety wire interference, and then do the final "proof" test to confirm the correct level.

The 13/32cd gage needs to have the dip portion away from the wall of the casting; the fuel, especially in a clean carburetor, establishes a quite significant meniscus at the wall. You need to be sampling for level out in the "flat" portion of the fuel.

Trying to determine how close the dip portion of the gage is to the clear, invisible fuel (i used auto non-leaded, which has a very faint tinge of blue) is very difficult, since the slightest contact of the gage to the fuel will have a meniscus form instantly at the interface. It takes a little playing to move the gage tip toward the fuel slowly, and note how close it is to being all the way down when the fuel "jumps" up on it.

Remember. After you are "done" and have torqued the needle valve, let the system stand for an hour with the head of fuel attached to see if there is any seep.

Note: the c-90 float level is supposed to be  $7/32$ ", per a cessna bulletin and cessna notes, but not per the stromberg manual. No one I know has ever used this dimension, and it seems suspect!!! Until more research has turned up the "why"---just realize that there is another mystery. Now that pacific airmotive has the licenses for the strombergs, ask them if there are any questions that cannot be answered by referring to the manuals.

One of the newest manuals we found notes that the minimum float travel is 0.048. That dimension is not on any of the bulletins, as far as I know, but seems a reasonable thing to check, too, since too-small a movement would limit the rate at which the fuel of the bowl could be replaced.

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Stromberg carb adjust sixth revision

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